IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:		
R. L. Sharrah et al	:	**Art Unit: 2821**
Appl. Serial No. 10/772,786	:	**Examiner: Ephrem Alemu**
Filed: February 5, 2004	:	**Confirmation No. 5199**
For: POWER CONTROL ARRANGEMENT, AS FOR A FLASHLIGHT	:	

Certificate of Mailing Under 37 C.F.R. §1.8(a)

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March 28, 2006
Date of Certificate

By: Jacqueline D. Bailey

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Facsimile Number: 571-273-8300 Number of Sheets: 19

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By:

DECLARATION OF RAYMOND L. SHARRAH AND NORMAN A. MESSINGER UNDER 37 C.F.R. §1.131

WE, RAYMOND L. SHARRAH AND NORMAN A. MESSINGER, HEREBY DECLARE AND SAY:

1. We are the inventors named in the captioned U.S. Patent Application No. 10/772,786 filed February 5, 2004 and entitled "POWER CONTROL ARRANGEMENT, AS FOR A FLASHLIGHT."

2. Raymond L. Sharrah is employed by Streamlight, Inc, , located in Eaglesville, Pennsylvania,

to which the captioned U.S. Patent Application is assigned, and has been so employed since 1978. Norman A. Messinger is doing work for Streamlight, Inc., and has been doing work for Streamlight, Inc. relating to flashlights since about 1980.

3. Raymond L. Sharrah was awarded the Bachelor of Science degree by West Chester University in 1978. Norman A. Messinger was awarded the Bachelor of Science degree in Electrical Engineering by the University of Delaware in about 1958.

4. Raymond L. Sharrah has been engaged in the development of flashlights for about 30 years, and is a named inventor in over 35 Patents and Patent Applications relating to flashlights that are assigned to Streamlight, Inc. Norman A. Messinger has been engaged in the development of flashlights for about 28 years and is a named inventor in three Patents relating to aviation electronics, and in two Patent Applications relating to the subject of flashlights that are assigned to Streamlight, Inc.

5. The invention claimed in the captioned U.S. Patent Application relates to a power control arrangement, as for a flashlight, in which the voltage of a battery is compared to a reference for extinguishing a relatively higher power lamp when the battery voltage drops to a predetermined threshold, and in which a relatively lower power light source, such as a light emitting diode (LED), may be provided for producing illumination after the battery drops to the predetermined threshold.

6. We have reviewed U.S. Patent No. 6,841,941 issued to Paul Y. Kim et al for "Brightness Controllable Flashlights" (the "Kim Patent") which states on its face that it was filed in the U.S. Patent and Trademark Office as Application No. 10/346,537 on January 16, 2003 (the "Filing Date").

7. The Kim Patent relates to a flashlight wherein a three-position switch (OFF position; first ON position, and second ON position) connects an electrical component 28 in circuit when the switch 26, 126 is in a first ON position for enabling a controller circuit 30, 130 to detect the presence of the electrical component 28, 100 in circuit for selecting the brightness of the incandescent light 18, 118. Certain figures of the Kim Patent show embodiments having three light emitting diodes (LEDs 20) in addition to an incandescent lamp 18, but the LEDs 20 are connected to the battery and are not switched by the controller circuit 30 or by a second switch.

8. Kim et al describes regulating the power applied to the lamp for providing constant brightness and describes abruptly reducing the level to which the power applied to the battery is regulated when the battery approaches exhaustion to provide an indication a need for battery replacement. Kim et al does not, in our opinion, describe or suggest that the lamp be de-energized, or that it be de-energized when the battery reaches a predetermined potential.

9. The January 16, 2003, Filing Date of The Kim Patent is less than one year prior to the February 11, 2003, effective filing date of the captioned U.S. Patent Application which claims the priority of U.S. Provisional Patent Application No. 60/446,639 filed on February 11, 2003.

10. Prior to the Filing Date of The Kim Patent, Raymond L. Sharrah and Norman A. Messinger invented the invention described and claimed in the captioned U.S. Patent Application in the United States. In evidence thereof are attached hereto Exhibits A-1 to A-3, B-1 to B-2 and C-1 to C-3, each of which was created and describes events that occurred in the United States prior to the Filing Date of the Kim Patent. The date or dates thereon have been blanked out.

11. Exhibits A-1 to A-3 hereto include a description of our invention and has three parts that are designated as Exhibits A-1, A-2 and A-3.

Exhibit A-1 is entitled "20XP w/ LEDs, Power Cut-Off System" and includes three pages of description of our invention and includes an Overview that describes our invention in general terms and the need for our invention and a Theory of Operation that describes the operation of an example circuit embodying our invention in relation to the electrical circuit diagrams that follow. The "3 schematics" described at the bottom of page 1 of 3 refers to the schematic diagrams of Exhibit A-2 and the "bill-of-material" described at the bottom of page 1 of 3 refers to Exhibit A-3.

Exhibit A-2 includes three sheets of electrical circuit diagrams of which two sheets are for a "20XP-LED RECHARGEABLE" flashlight and one sheet is for a "20XP-LED NON-RECHARGEABLE" flashlight.

The electrical circuit diagram entitled "20XP-LED NON-RECHARGEABLE" includes of an embodiment of a control arrangement having a Switch Board that is connected in circuit with an incandescent lamp (LAMP) and a battery and that connects via connector P-1 to light emitting diodes of an LED Board, e.g., as shown in Figure 2 of the captioned Application. The control arrangement acts to de-energize the lamp when the battery voltage decreases to a predetermined threshold.

The two electrical circuit diagrams entitled "20XP-LED RECHARGEABLE" include embodiments of a control arrangement having a Switch Board that is connected in circuit with an incandescent lamp (LAMP) and a battery and that connects via connectors P-1, S-1 to light emitting diodes CR3-CR5 of an LED Board (LED Board not shown on second diagram), e.g., as shown in Figure 3 of the captioned Application. A Charge Sleeve is also provided for charging the battery, e.g., as shown in Figure 3 of the captioned Application. The control arrangement acts to de-energize the lamp when the battery voltage decreases to a predetermined threshold.

Exhibit A-3 includes three sheets of a Bill of Materials (BOM) entitled "20XP-SWITCH BOARD BOM, PRINTED CIRCUIT BOARD ASSY #251005 & 240007" which are the circuit board assemblies identified as "SWITCH BOARD

ASSY - 240007" and "SWITCH BOARD ASSY - 251005" shown on the electrical circuit diagrams of Exhibit A-2. Materials identified in this BOM relate by symbol designations to the components shown on the electrical circuit diagrams of Exhibit A-2 and are for either or both of an Assembly 251005 which is for use with a battery having five cells and an Assembly 240007 which is for use with a battery having three cells. The electrical parts identified were used to construct one or more embodiments of the invention.

12. Exhibit B-1 is an electrical circuit diagram entitled "20XP-LED RECHARGEABLE" of an embodiment including a control arrangement having a Switch Board that is connected in circuit with an incandescent lamp (LAMP) and a battery and that connects via connectors P-1, S-1 to light emitting diodes CR3-CR5 of an LED Board, e.g., as shown in Figure 3 of the captioned Application. A Charge Sleeve is also provided for charging the battery, e.g., as shown in Figure 3 of the captioned Application. The control arrangement acts to de-energize the lamp when the battery voltage decreases to a predetermined threshold.

13. Exhibit B-2 is a graphical plot entitled "New 20XP with Transistor Switch" that shows battery voltage of a five-cell rechargeable battery and the voltage applied to a lamp as a function of time by an embodiment of the circuit illustrated in Exhibit B-1 hereto that was constructed and operated in the United States prior to the filing date of the Kim Patent. The upper plot "CH1 - Lamp & Batt V" shows the voltages of the lamp and of the battery. After the lamp has operated for a time period of about 65-70 minutes, the battery voltage has decreased, e.g., ~~form~~ from about 6.5 volts, to a predetermined threshold, e.g., about 3 volts. At that time, the voltage applied to the lamp decreases by operation of the circuit to substantially de-energize the lamp while the battery voltage remains at about 3 volts until the lamp is de-energized by the transistor turning off, as shown by the increasing voltage plot identified as "CH2 - Transistor V." Once the lamp is de-energized, the battery is unloaded and the battery voltage ("CH1") rises, e.g., to about 6 volts.

14. Exhibit C-1 includes a graphical plot "CH1 - Lamp & Batt V" of battery voltage of a five cell battery and of the voltage applied to a lamp as a function of time from a test of an embodiment "New 20XP with Transistor Switch" of a circuit of the sort illustrated in Exhibits A and B-1 hereto that was constructed and operated in the United States prior to the filing date of the Kim Patent. In this embodiment, a device "Zetex ZR431C" was utilized as a reference voltage and the lamp was a nominal 8-watt lamp load. After a time period of about 45-50 minutes when the battery voltage decreased from about 6.2 volts to a predetermined threshold, e.g., about 3.5 volts, the voltage applied to the lamp decreases to substantially de-energize the lamp and the voltage across the transistor "CH2 - Transistor V" increases as it comes out of saturation. During this time the battery voltage remains at about 3.5 volts until the lamp is de-energized and then being unloaded rises to about 5.6 volts.

P03087US1 (243-Streamlight)
Declaration of
Raymond L. Sharrah & Norman A. Messinger

PATENT APPLICATION
Serial No. 10/772,786

15. Exhibits C-2 and C-3 include graphical plots entitled "LED Discharge on New 20XP with 'Reserve Capacity'" which show the current flowing through three LEDs operating from a battery following de-energization of the lamp as shown by Exhibit C-1, i.e. after the battery has been discharged by operating a lamp load for a period of time. The plot "CH1 - LED Current" shows the total current flowing through the three LEDS for about 60 minutes following de-energization of the lamp, and the battery voltage "CH2 - Lamp & Batt V" of battery voltage of a five cell battery and of the voltage applied to a lamp as a function of time from a test of an embodiment of a circuit of the sort illustrated in Exhibits A. The plots of Exhibits C-2 and C-3 differ because they are from tests conducted using batteries from two different battery manufacturers, and so the batteries have different characteristics.

16. The documents of Exhibits A-1 to A-3, B-1 to B-2 and C-1 to C-3 are all dated prior to the Filing Date of The Kim Patent and evidence the conception and reduction to practice of the invention described and claimed in the captioned Application in the United States prior to the Filing Date of the Kim Patent.

All statements made herein of our own knowledge are true and all statements made on information and belief are believed to be true. We understand that willful false statements and the like are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code (18 U.S.C. §1001) and may jeopardize the validity of the patent application or any patent issuing thereon.

RAYMOND L. SHARRAH

Declarant's Signature

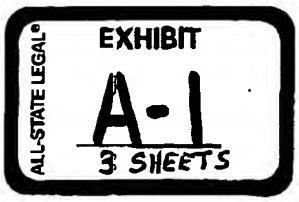
3-23-06
Date

NORMAN A. MESSINGER

Norman A. Messinger
Declarant's Signature

23 MARCH 2006
Date

Exhibits A-1 to A-3.
Exhibits B-1 to B-2.
Exhibits C-1 to C-3.



[redacted]

20XP w/LEDs

Power Cut-Off System

Overview

The 20XP w/LEDs is a flashlight composed of a incandescent lamp, 3 LED illuminators, battery, two switches and a body to hold all items in formation.

One switch is used to turn the incandescent lamp on and off. The second switch is used to turn the LEDs on and off. Operation of the lamp and LEDs is totally independent.

A feature of this flashlight system is to provide backup illumination when the incandescent lamp has discharged the battery to such a level that the lamp has little or no useful light output. To this end, a suitable control circuit is used to monitor the battery voltage as it reduces due to operating the lamp and to remove all current to the incandescent lamp when the battery voltage reduces to a specific level. At this level, there is sufficient battery energy to support operation of lower power consumption LEDs for a substantial period of time. The light output of the LEDs, albeit less than from a fully powered lamp, is substantial and provides continued illumination long after the incandescent lamp would have gone totally dark.

Without a discharge cut-off system, an operator of a flashlight can inadvertently allow the battery to be discharged to the zero energy level by simply forgetting to turn the light off or intentionally keeping the light turned on to "squeeze" as much run time from the system as possible. In either scenario, the result is a severely discharged battery which has insufficient energy to support even the most minimal power illumination device.

Theory of Operation

The 20XP flashlight will be produced in two versions: (1) A rechargeable unit utilizing a rechargeable battery and (2) a unit powered by a non-rechargeable (alkaline) battery.

I have provided 3 schematics: (1) complete system (2) rechargeable unit and (3) non-rechargeable unit. A bill-of-material is also provided for reference.

[redacted]

Please refer to the non-rechargeable schematic as it fully encompasses the subject invention and is the simplest version.

A plurality of LEDs with suitable current limiting resistors is connected to plug P-1. This connects the LEDs in series with switch SW2 and the battery allowing the LEDs to be turned on or off independent of any other circuit operation.

Switch (1) and (2) are located on the outside of the flashlight and are available to the operator at any time.

If the light is off (SW1 open), no current flows through Q1 or R5, Q2 base current is zero and no current flows through lamp.

The incandescent lamp is turned on and off by operating SW1. The two transistors are connected in a supportive configuration. That is, if Q2 is on then Q1 is on. And if Q1 is on then Q2 is on. Closing SW1 causes the voltage on the (+) end of C1 to rise to battery voltage causing a pulse of current to flow through the base of Q2. This causes Q2 to conduct (turn on) which in turn reduces the collector voltage of Q2. Current then flows through the base of Q1. Q1 then conducts current to the base of Q2 via CR-D and R3/R4. This current reinforces the current pulse through C1 and keeps Q2 in a conductive state which keeps Q1 in a conductive state. The lamp is now fully lighted and stays lighted until either SW1 is opened or the voltage cut-off occurs.

Voltage cut-off occurs when the battery voltage is no longer high enough to maintain drive current to the base of Q2. CR-D and R3/R4 represent a voltage drop between Q1 and the base of Q2. When the base current of Q2 is no longer able to maintain Q2 in a saturated state, the collector voltage of Q2 begins to rise which removes the base current to Q1 and the supportive couple of Q1 and Q2 collapses. Current no longer flows through the lamp and the incandescent lamp of the flashlight is fully off.

Since the lamp is off, current drawn from the battery is reduced to a negligible level; the current through R2. The remaining battery energy is now available to power the LED circuit. The incandescent lamp remains off until the operator first turns SW1 off and then turns SW1 back on. If the battery voltage is low, turn on cannot be initiated.

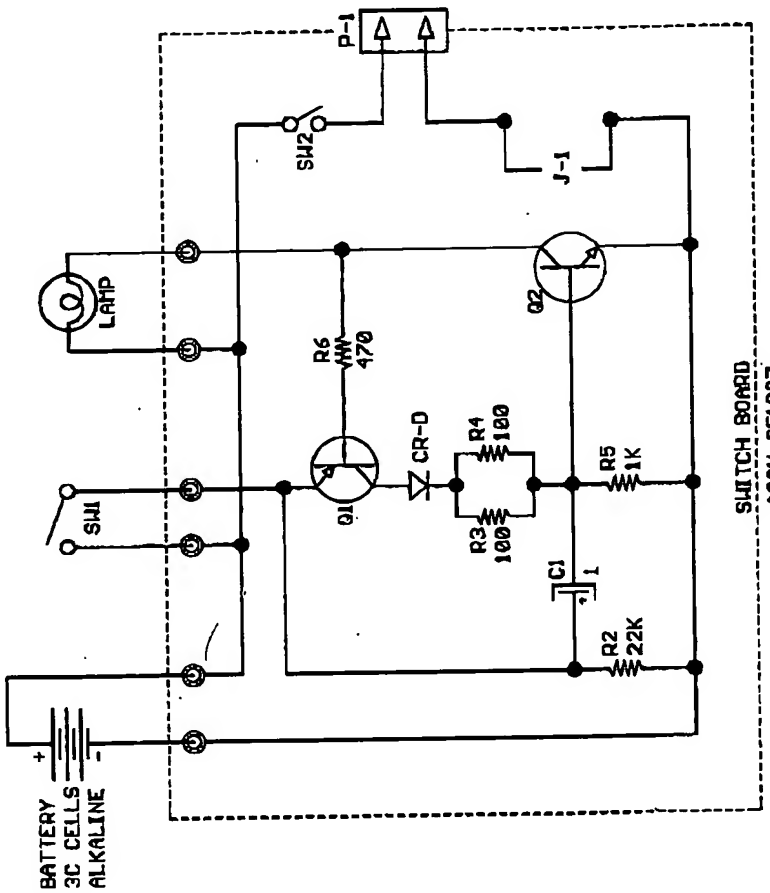
[redacted]

This system works because as batteries become discharged, their internal impedance increases which decreases apparent battery voltage though significant energy remains. When the heavy load of the lamp is removed, the voltage rises sufficiently to power the LEDs for a substantial and usable period of time.

The rechargeable version of the light functions the same way. CR1 is added to allow battery charging, R7 is inserted to limit LED current due to the higher battery voltage and CR-D (ordinary diode) is replaced with a CR-Z (zener diode) to obtain higher voltage drop required by the higher battery voltage.

EXHIBIT
A-2
3 SHEETS
ALL-STATE LEGAL®

STREAMLIGHT INC.
30 EAGLEVILLE ROAD
EAGLEVILLE, PA 19403



20XP-LED NON-RECHARGEABLE

BARE PCB - 240005
PCB ASSY - 251007 [redacted]

RESISTORS 1/4 W UNLESS NOTED

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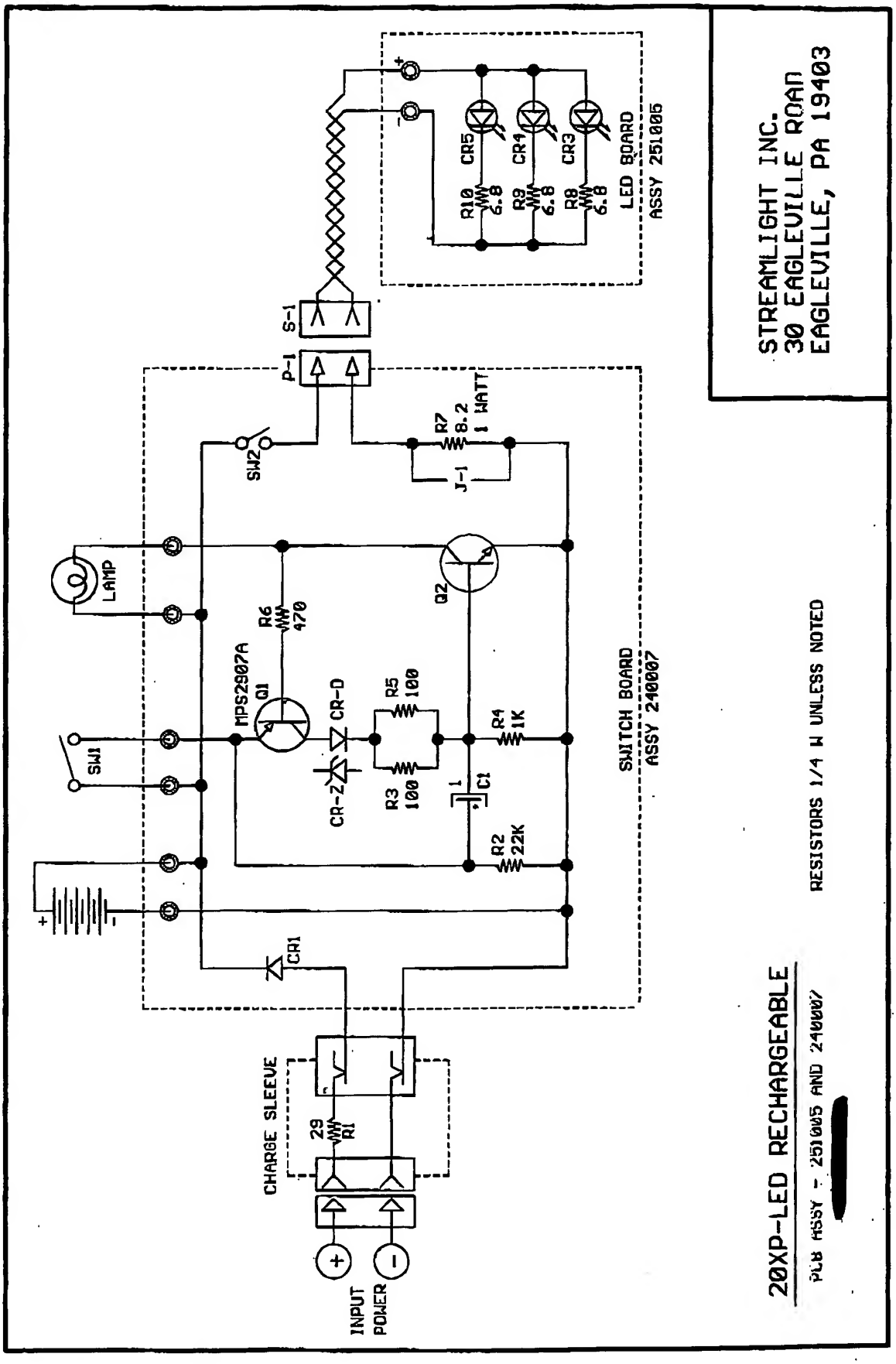

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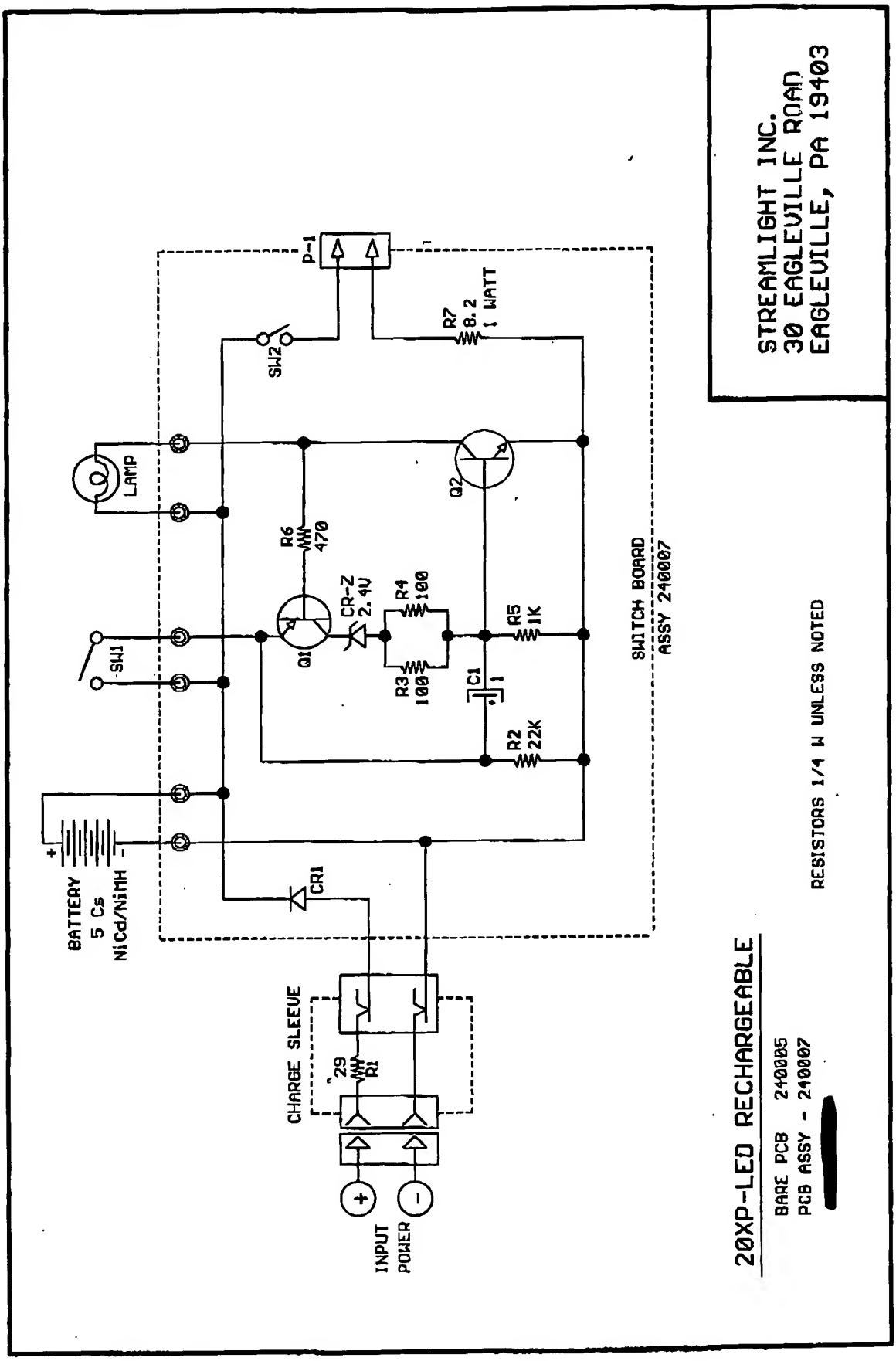

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Revised:

20XP-SWITCH BOARD BOM

PRINTED CIRCUIT BOARD ASSY #251005 & 240007

Items 1-12 are common to Assemblies 251005 & 240007

ITEM	SYMBOL	DESCRIPTION	SOURCE
1.	C1	Capacitor, Tantalum, Radial 1.0 uf +/-20%, 23 VDC (D=.18", H=.28")(LS=.10")	Mouser 581-TAP105K025SCS
2.	R2	Resistor, 22K +/-5%, CF, 1/8 Watt	Mouser 299-22K
3.	R3	Resistor, 100 +/-5%, CF, ¼ Watt	Mouser 281-100
4.	R4	Resistor, 100 +/-5%, CF, ¼ Watt	Mouser 281-100
5.	R5	Resistor, 1K +/-5%, CF, 1/8 Watt	Mouser 299-1K
6.	R6	Resistor, 470 +/-5%, CF, 1/8 Watt	Mouser 299-470
7.	Q1	Transistor, PNP, General Purpose TO-92, MPS2907A	Mouser 625-MPS2907A
8.	Q2	Transistor, NPN, High Power E-Line, Zetex ZTX-849	Digi-Key ZTX849-ND
9.	SW1	Switch, Double Pole-Double Throw 100 ma @ 30 VDC, Detented APEM P/N MHPS2283	APEM (WUJIN) Electronic Co. Henglin Town, Wujin City Jiansu Province, 213101 P.R. of China
10.	P-1	Connector Header, 2-pin, Side Entry JST Type S-2B-EH	J.S.T. Corporation 1957 S. Lakeside Drive Waukegan, IL 60085 PH: 847-473-1957

Created: [redacted]
Revised:

20XP-SWITCH BOARD BOM

PRINTED CIRCUIT BOARD ASSY #251005 & 240007

ITEM	SYMBOL	DESCRIPTION	SOURCE
11.	M1	Wire, Silicone, Gray, 75 mm Quantity 2	Ref SL 201733
12.	M2	Connector, Lamp Quantity 2	Ref SL 450081
13.	M3	Shrink Tubing, Black Quantity 2	Ref SL 201302
14.	M4	Cable Tie, .07" Wide, 2.8" Long, Nylon Panduit PAN-TY	Digi-Key 298-1016-ND Panduit PLT.6SM-C
15.	M5	Printed Circuit Board, P/N 240005 Rev A	

The following items are added to items 1-13 to complete Assembly #251005 (5 Cells)

16.	CR1	Diode, 1 amp, 100 PIV, 1N4002	Mouser 592-1N4002
17.	CR2	Diode, Zener, 500mw, Axial, 2.4V	Mouser 512-1N5221B Mouser 78-TZM5221B
18.	R7	Resistor, 8.2 +/-5%, MO, 1 Watt	Mouser 281-8.2

The following items are added to items 1-13 to complete Assembly #240007 (3 Cells)

19.	CR2	Diode, Small Signal, 1N4148	Mouser 512-1N4148
20.	M5	#6 Ring Lug	Ref SL 201751
21.	M6	Wire, Silicon, Gray, 75 mm	Ref SL 201733
22.	J-1	Wire, Jumper, bare, #22, tinned, 15 mm	

Created: [redacted]
Revised:

20XP-SWITCH BOARD BOM

PRINTED CIRCUIT BOARD ASSY #251005 & 240007

REVISIONS

Revised:

EXHIBIT
B-1

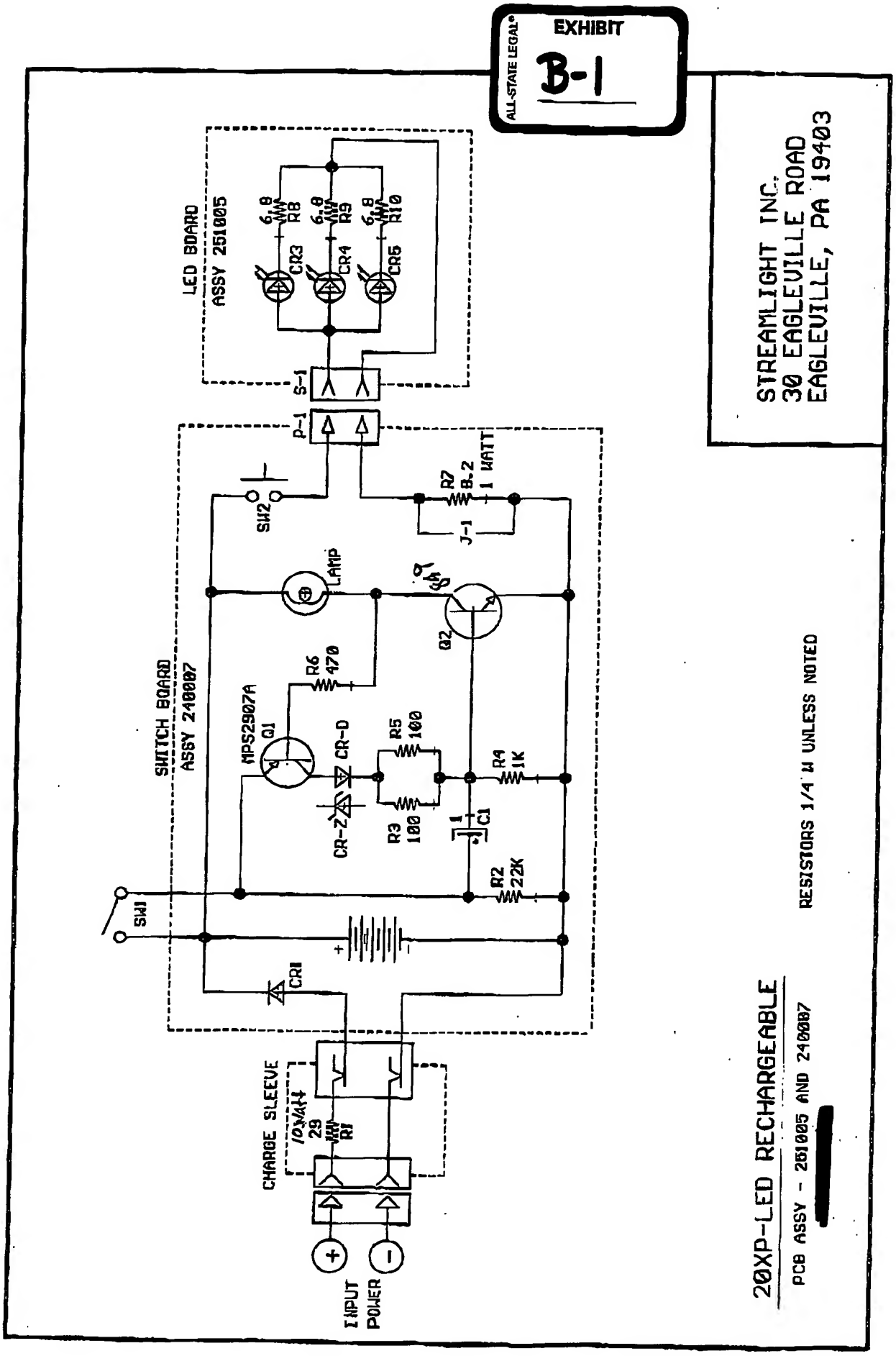

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EXHIBIT
B-2
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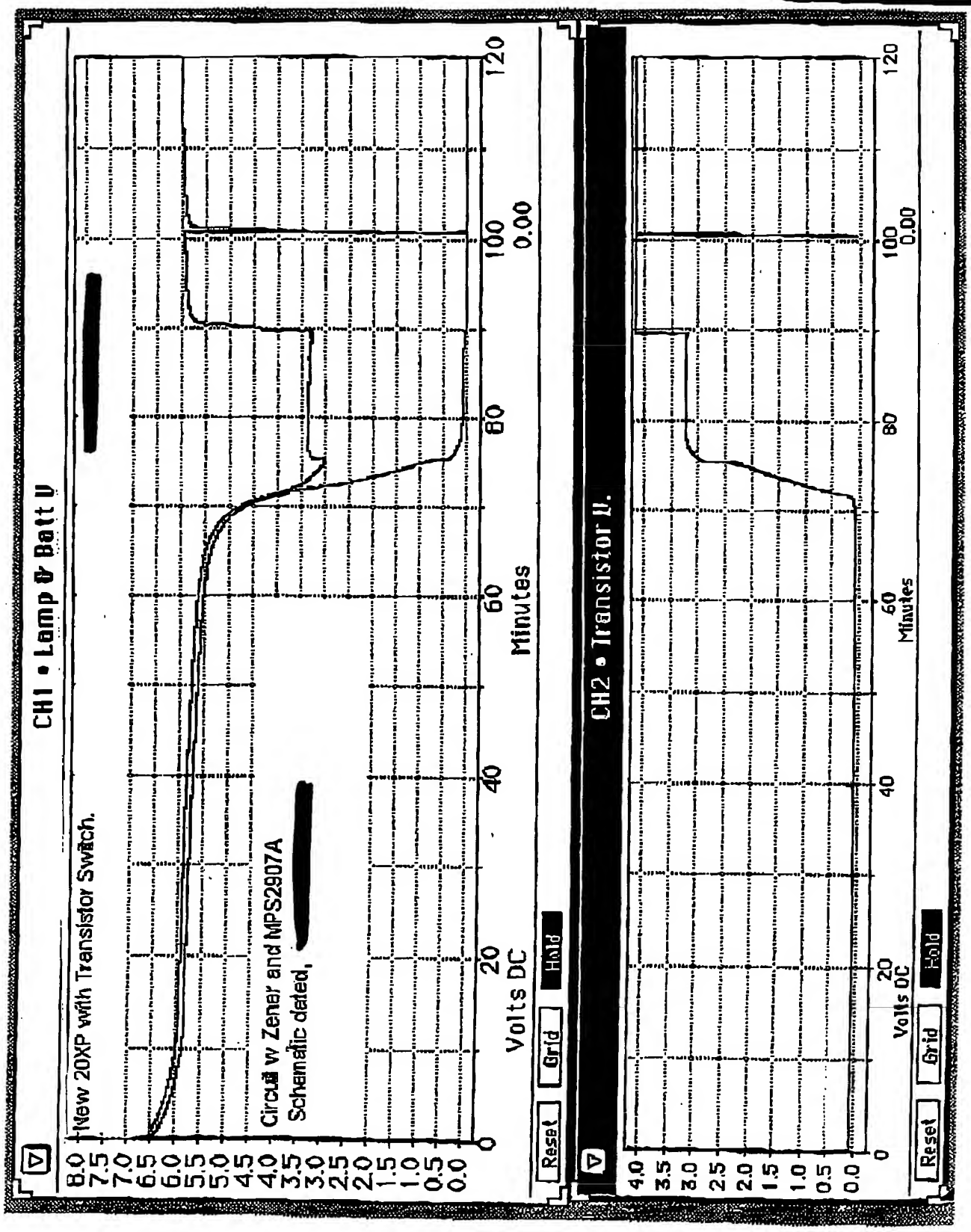

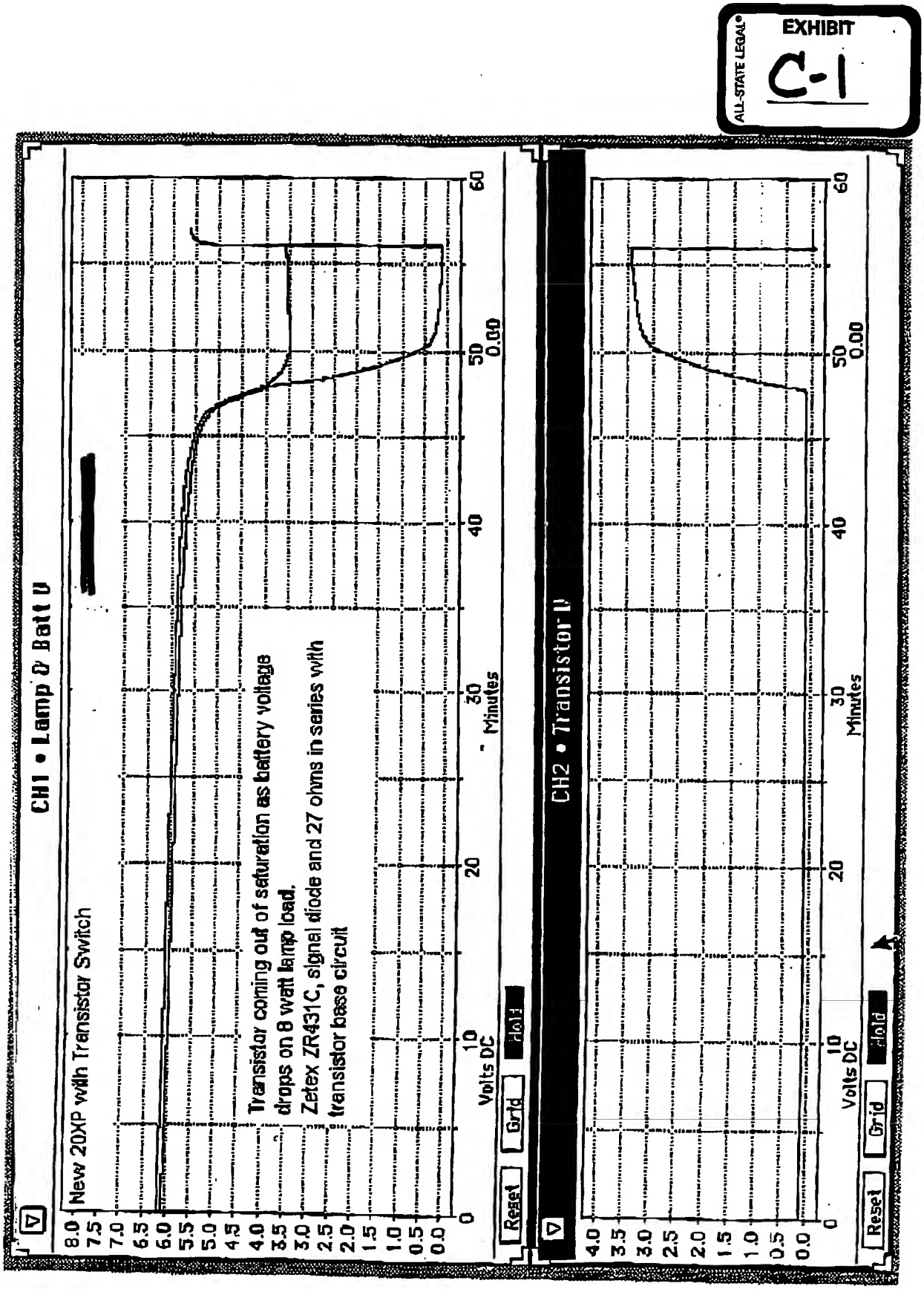
EXHIBIT
C-1
ALL-STATE LEGAL
CH1 • Lamp & Batt V
New 20XP with Transistor Switch
Transistor coming out of saturation as battery voltage drops on 8 watt lamp load.
Zetex ZR431C, signal diode and 27 ohms in series with transistor base circuit
Minutes
Volts DC
Reset
Grid
Hold
CH2 • Transistor V

EXHIBIT
C-2
ALL-STATE LEGAL

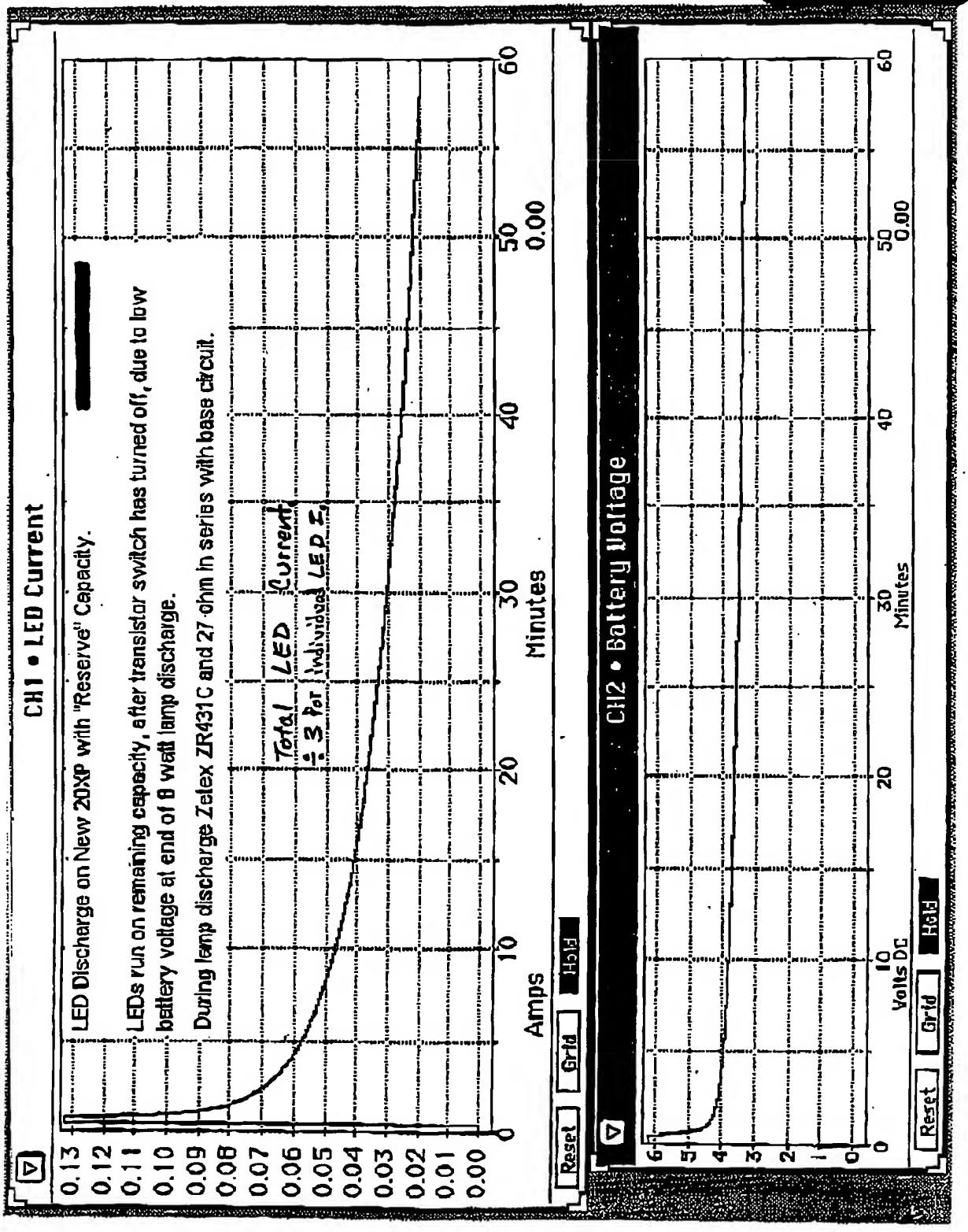

EXHIBIT
C-3
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